Bottomland Forest Information Sheet

Conservation Practice Information Sheet ***(IS-MO643F)***

Recreating a Bottomland Forest

What is a Bottomland Forest?

A bottomland is defined as a location in the landscape that periodically floods (often within a 100-year floodplain), but standing water is usually absent during the growing season.

In Missouri, two distinct types of forested bottomlands can be found: major bottomlands and minor bottomlands. A **major** bottomland is associated with large Missouri rivers, such as the Missouri, Mississippi, Osage, Grand, Chariton, and Gasconade rivers, and is formed with alluvium of regional origin. Major bottomlands often experience a long flooding duration that is less frequent than a minor bottomland. Because of the flooding duration and intensity, soils formed from material of regional origin vary greatly in texture and content and are often richer and more productive than a minor bottomland. **Minor** bottomlands are associated with the smaller Missouri streams having alluvial soil deposits formed of local origin and more consistent texture and mineralogy. Flooding frequencies are greater than major bottomlands but flooding durations are much shorter. Consequently, minor bottomlands may be less rich and productive, although that is not always the case.

Historically the bottomland areas along Missouri rivers and streams were primarily forested. Important woody species in these forested flood plains included pin oak, bur oak, swamp white oak, cottonwood, elm, green ash, willows, river birch, silver maple, sycamore, hackberry, sugarberry, pecan, and sweetgum. In addition, bald cypress, water tupelo, willow oak, cherrybark oak, overcup oak , swamp chestnut oak, and water oak were native to the bottomlands of Southeast Missouri.

Pre-settlement bottomland forests such as this bald cypress-tupelo swamp were once common in Southeast Missouri.

These forests provided many important economic and ecological services for early inhabitants. Since settlement, over 95% of these forests have been converted to agricultural land and other uses. The remaining forestlands have been impacted by changes in hydrology *(properties, distribution and circulation of water)* due to channelization, construction of locks and dams and levees, loss of wetlands, harvesting activities, and other human induced causes.

Types of Bottomland Forests

The primary attributes that affect the type and tree composition of bottomland forests are hydrology, topography, and soil type. Floodplains and riparian areas adjacent to large incised streams and rivers are often underlain by sand and gravel deposits, and can make for relatively dry growing conditions. Such sites may have tree communities more often associated with drier upland conditions. In contrast, poorly drained soils in that pond

water may be so wet that only a few extremely water tolerant trees can survive. While the character and structure of bottomland forests vary greatly across Missouri, six distinct major forest communities can be identified and described.

- Dry-mesic bottomland forest
- Mesic bottomland forest
- Wet-mesic bottomland forest
- Wet bottomland forest
- Swamp forest
- Riverfront forest

Dry-mesic bottomland forests are most distinct in the Ozark and Ozark Border natural divisions. These forests are restricted to narrow valleys of high-gradient streams and typically consist of white oak, northern red oak, black walnut, sycamore, flowering dogwood, hop hornbeam and occasionally shortleaf pine.

Mesic bottomland forests typically occur on flood plains of larger Ozark streams that have good internal drainage and throughout the Glaciated Plains division on high-gradient streams. Dominant woody species include sugar maple, bitternut hickory, hackberry, and white oak. Black cherry, black walnut, swamp white oak, sycamore, Ohio buckeye, green ash, spice bush, pawpaw, and blue beech are also present.

Wet-mesic bottomland forests were at one time the most extensive bottomland forest in Missouri. These forests are associated with meandering river systems with broad, level valleys and characteristically experience long duration flooding. Species common to this type of forest include bur oak, swamp white oak, shellbark hickory, cottonwood, pin oak, and pecan with cherrybark oak, sweet gum, and basket oak also common in the Lowlands section.

Wet bottomland forests are associated with level valleys on streams and rivers that are wet or ponded for significant periods throughout the year but usually becoming dry during the growing season. Dominant woody plants include pin oak, cottonwood, black willow, river birch, and silver maple with bald cypress, swamp red maple and swamp tupelo common in the Lowlands section.

Swamp forests occupy inundated depressions, oxbows, and backwater sloughs of stream and river flood plains of the Lowland section. The sites are poorly drained and surface water is present for extended periods of the year. Species common to swamp forests include bald cypress, swamp tupelo, pumpkin ash, swamp red maple, and buttonbush.

Riverfront forests occur directly adjacent along rivers and streams. These linear forests are usually associated with higher micro-relief elevations and better drainage. Typically, species include sycamore, cottonwood, silver maple, elm, hackberry, and green ash.

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Converting pasture or crop fields to a bottomland forest should take into account landowner objectives, topography, soils, adjacent vegetation, hydrology, and cost. This practice should only be applied on fields with woodland or transitional soils that comprise at least 50 percent of the field.

Species selection

Use the bottomland forest type descriptions for general guidelines on suitable tree species or use NRCS Conservation Tree and Shrub Suitability Groups (CTSG) to determine appropriate woody species to plant on the site. Table 1 provides some suggested species to plant along with selected woody characteristics.

At least five species of native trees and two native shrubs are required when establishing a bottomland forest. It is always recommended to use a diverse mixture to help avoid problems with disease, insect, and weather-related mortality affecting a large portion of a less-diverse planting.

Site preparation

It is important to have a good seedbed free from competing vegetation and suitable for the planned planting method. A herbicide application along with disking or plowing is often required for successful plantings. Several treatments may be necessary to eradicate undesirable vegetation. Typically, two well-timed herbicide applications are usually adequate. Old fields and fallow areas may require multiple treatments for one or two growing seasons to eradicate aggressive species. Plantings into killed sod are often more difficult and less successful than those done into a well-prepared, weed-free seedbed. If tillage is used as a site preparation method, allow some time for the soil to settle before planting.

Drainage projects in southeast Missouri have permanently altered the hydrology of the region. Bottomland forest restoration plans should take into account the current hydrologic conditions of the site.

Planting materials and methods

Trees can be established by using one of three types of planting materials: Seedlings/containers, cuttings, and seeds. Use the appropriate plant material based on site conditions and species.

Cuttings are suitable for several species, such as willows or cottonwood. Cuttings are best used in moist soils and streambanks. They are planted at an angle of 45-60 degrees with at least two buds above ground and pointing upward.

Bareroot seedlings are the most common method for tree and shrub plantings. Container grown stock can also be used.

Seed planting is usually limited to large seeds from the oak and hickory families. White oak family acorns are best planted in the fall soon after collection. Acorns of the red oak family can be planted anytime from November through April when soil and site conditions allow. Seed must be completely covered by soil, and can be planted via broadcast, strip, spot, or machine methods.

Planting methods include hand planting, machine planting, or natural regeneration. The method of planting should be determined by the type planting material being used, costs, and equipment availability. Natural regeneration is a method that can be used only in specific circumstances. An existing seed source of mature woodlands of desirable species must be located within 300 feet of the planting area. This method will work well in sites likely to be colonized by soft-mast or light-seeded species such as ash, cottonwood, sycamore, elm, maples, and boxelder. Sites that experience frequent flooding and depression areas too wet to machine or hand plant lend themselves to natural regeneration. Site preparation techniques that create a bare soil seedbed before targeted tree seeds mature and drop, will be required.

Seeding rates

Generally, cuttings and seedlings are planted at a minimum 302 plants per acre. Large container grown trees should be planted at 48 trees per acre. Direct seeding requires a minimum of 1500 seeds per acre for machine or hand planted methods. Broadcasting seed will require at least 3000 seeds per acre. Refer to your tree and shrub planting plan for specific seeding rates.

Restoration of hydrology

Where practical, original hydrology will be restored to allow the development of proper vegetative community characteristics.

Management

With the exception of natural regeneration sites, follow-up management to control competing weeds is essential to have a successful stand. Provide a 2-3 foot (diameter) competition free zone around all woody plantings. Weed control techniques will be used until the trees are free to grow, usually meaning the tree crowns are above the height of the competing vegetation and/or have formed a canopy over the weeds.

A combination of herbicide applications and/or light disking can be used to control undesirable vegetation. Mowing alone will not control grassy weeds that compete very aggressively with young trees. Consult your plan for specific recommendations, or contact your MDC or NRCS forester for additional information.

This picture illustrates the importance of weed control around trees. The trees on the left did not have any herbicide weed control, while the much larger trees on the right are the same age and have benefited from weed control.

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Table 1. Plant List for Bottomland Forests

Species (Common/Scientific)	Flooding Tolerance	Large Debris	Shade Value	Wildlife Merit	Height (feet)	Growth Rate	CTSG Group
ash, green *Fraxinus pennsylvanica*	M	M	H	M	60	H	1,2
white *Fraxinus americana*	M	M	H	M	70	M	1
bald cypress *Taxodium distichum*	VH	M	M	M	80	M	1,2
birch, river *Betula nigra*	M	H	M	M	50	M	1,2
buttonbush *Cephalanthus occidnetalis*	VH	L	L	L	10	M-H	2
cottonwood *Populus deltoides*	H	H	M	H	90	H	1.2
dogwood, silky *Cornus obliqua*	H	L	L	H	12	M-H	1,2
red-osier *Cornus stolonifera*	H	L	L	H	12	M-H	1,2
hackberry *Celtis occidentalis*	M-L	M	M	M	60	M	1
hawthorn, green *Crataegus virdis*	M	L	L	H	20	M	1,2
hickory, shellbark *Carya laciniosa*	M	M	H	H	70	M	1
holly, deciduous *Ilex opaca*	VH	L	L	M	16	M	1,2
maple, boxelder *Acer negundo*	M	H	M	M	40	H	1
silver *Acer saccharinum*	M-H	H	H	M	80	H	1,2
red *Acer rubrum*	M	M	H	M	70	M	1
oak, bur *Quercus macrocarpa*	H	M	H	H	80	L	1,2
pin *Quercus palustris*	M-L	H	M	H	75	M-H	1,2
Nuttall *Quercus nuttallii*	VH	M	H	H	70	M	2
willow *Quercus phellos*	M	M	H	H	70	M	1
overcup *Quercus lyrata*	VH	M	H	H	70	M	2
swamp white *Quercus bicolor*	M-H	M	H	H	70	M	1,2
cherrybark *Quercus pagodafolia*	M	M	H	H	75	M	1
shumard *Quercus shumardii*	M	M	H	H	80	M	1
pecan *Carya illinoensis*	M	M	H	H	80	L-M	1,2
persimmon *Diospyros virginiana*	M	M	M	H	50	L	1
privet, swamp *Forestiera acuminata*	VH	L	L	L	14	M	1,2
spice bush *Lindera benzoin*	M-L	L	L	M	16	M	1
sugarberry *Celtis laevigata*	M-L	H	M	M	60	M	1
sycamore *Platanus occidentalis*	H	H	M	H	90	H	1,2
wahoo *Euonymus atropurpureus*	M-L	L	L	M	12	M	1
walnut, black *Juglans nigra*	M-L	M	M	H	80	M	1
willow, black *Salix nigra*	VH-H	H	L	M	60	H	1,2
sandbar *Salix exigua (interior)*	VH	L	L	L	6	H	1,2
peachleaf *Salix amygdaloides*	H	L	L	L	30	H	1,2

VH = very high; H = high; M = medium; L = low; CTSG = conservation tree and shrub group

Photos by Jim Rathert, Missouri Department of Conservation and Doug Wallace, Natural Resources Conservation Service.